ON A NEW GENUS FOR "*TORNATINA*" *MURDOCHI* SUTER, 1913 (RETUSIDAE, OPISTHOBRANCHIA)

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Plate 17

ABSTRACT

Relichna n. gen. is erected for the species previously described as *Tornatina murdochi* Suter, 1913. A study of the alimentary canal, reproductive system, mantle cavity and nervous system show the relationship of the new genus to *Retusa* and *Rhizorus*. It is suggested that the Retusidae represent an independent evolutionary line within the Lower Opisthobranchia.

INTRODUCTION

Shells, similar in shape to *Cylichna* and *Retusa* were described by Murdoch and Suter (1906) as *Cylichna simplex*. Later, Suter renamed this species *Tornatina murdochi* (Suter, 1913), *Cylichna simplex* being preoccupied. Subsequent authors have placed this species in the genus *Retusa* (Powell, 1946; Dell, 1956).

A study of the anatomy of specimens from mud at 54 m off Deep Water Cove, Bay of Islands, show that this species is closely related to *Retusa*. However, because of differences in the form of the gizzard plates, it is more satisfactorily placed in a separate genus, newly created.

Relichna n.gen.

Type species: *Tornatina murdochi* Suter, 1913.

Shell small, cylindrical, involute, imperforate, thin and glossy. Sculpture absent, except for fine irregular growth lines. Colour, white. Spire sunken, deep and broad. Aperture as long as shell, narrow above, expanded below. Outer lip almost straight, slightly concave, rounded at both ends. Columella thin, rounded, slightly reflected at upper end.

Animal white, foot narrow, headshield bearing pair of small posterior lobes. No jaws or radula. Gizzard with three brown, unequal plates, concave on inner surface. No gill.

Relichna murdochi (Suter, 1913)

Synonymy: *Cylichna simplex* Murdoch and Suter, 1906: (non A. Adams, 1850).
Tornatina murdochi Suter, 1913: p. 526.
Retusa murdochi Powell, 1946 et seq.: p. 88.
Retusa aff *murdochi* Dell, 1956: p. 154.

Shell: A study of the holotype and paratypes from the Dominion Museum and N.Z. Geological Survey Collections respectively, show some variations in shell shape (Pl. 17, A, E). Specimens collected at the Bay of Islands, were not as variable in shape as the paratypes but were very similar in shape to the holotype. In Plate 17, B, the most extreme variant from Dell's Chatham Rise material, is illustrated. In the living animal, the shell appears quite transparent.

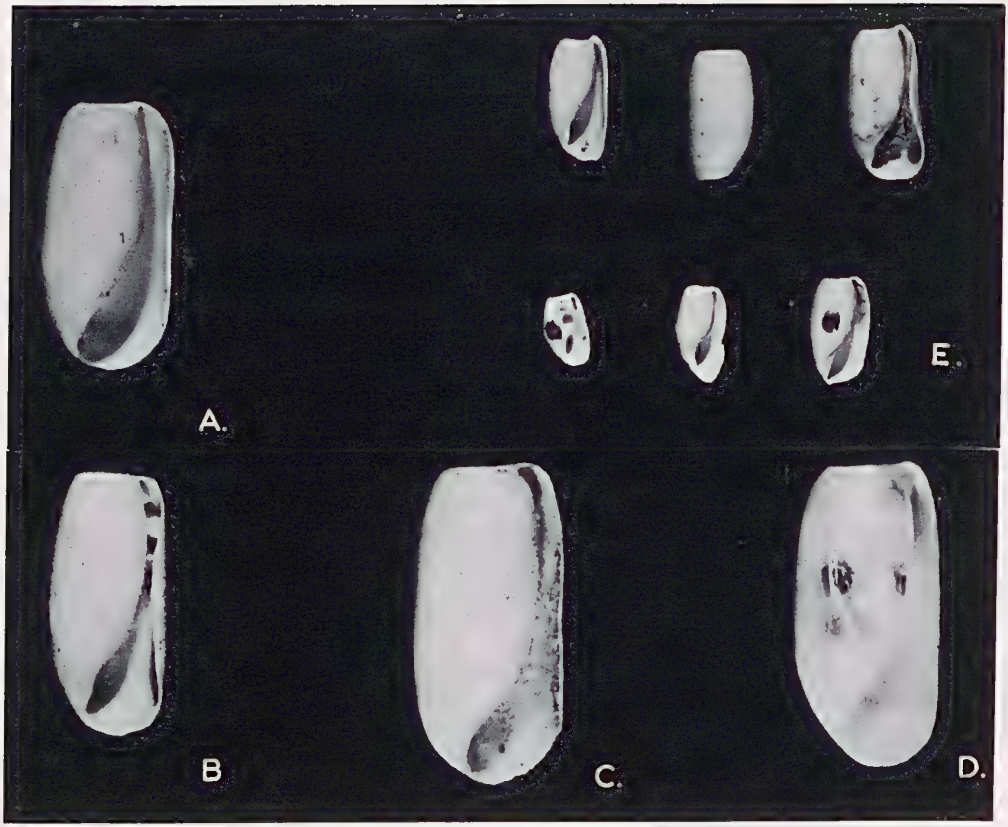

PLATE 17. *Relichna murdochi* n.gen. A, Holotype, Dom. Mus. Coll. M.1739, coll. 200 m off Great Barrier Is., 5 x 2.5 mm. B, ? *Retusa* aff. *murdochi* (Dell, 1956), coll. East of Forty Fours (Chatham Rise) in 234 m Station 34, Chatham Is. Expedition, 1954. Dom. Mus. Coll. M.10651, 5 x 2.5 mm. C, Dead shell, coll. Bay of Islands, 5 x 2.5 mm. D, Showing gizzard plates, and gizzard packed with foraminiferans, coll. Bay of Islands, 4.2 x 2.1 mm. E, Paratypes, N.Z. Geological Survey Coll., T.M. 1176 - 1181, coll. 200 m off Great Barrier Is., largest specimen 5 x 2.5 mm.

Photo — G. W. Batt.

Alimentary Canal: The buccal bulb, although shaped somewhat similarly to that of *Cylichna* (see Lemche, 1956), is without either jaw plates or radula. There are no extrinsic muscles. A thin walled, ciliated, middorsal channel runs the length of the buccal bulb and it is histologically similar to the oesophageal lining with which it communicates. The rest of the lining of the buccal cavity is unciliated and has large subepithelial mucous gland cells (Fig. 2C). At the posterior end of the cavity is a ventral mound which is possibly a remnant of an odontophore.

The oesophagus, thin and lined with a simple ciliated epithelium, quickly enlarges to form a thin walled distensible crop or gizzard, which contains three large, brown chitinous plates at the posterior end (Fig. 1C). The " crop " was often distended with six or seven foraminiferans of an undescribed species of the genus *Notorotalia* Finlay. The gizzard plates are unequal, one being slightly larger than the other two (Fig. 1D). In section, (Fig. 2A) we can see that the gizzard plates are formed of closely packed chitinous rods. The plates are concave on their inner

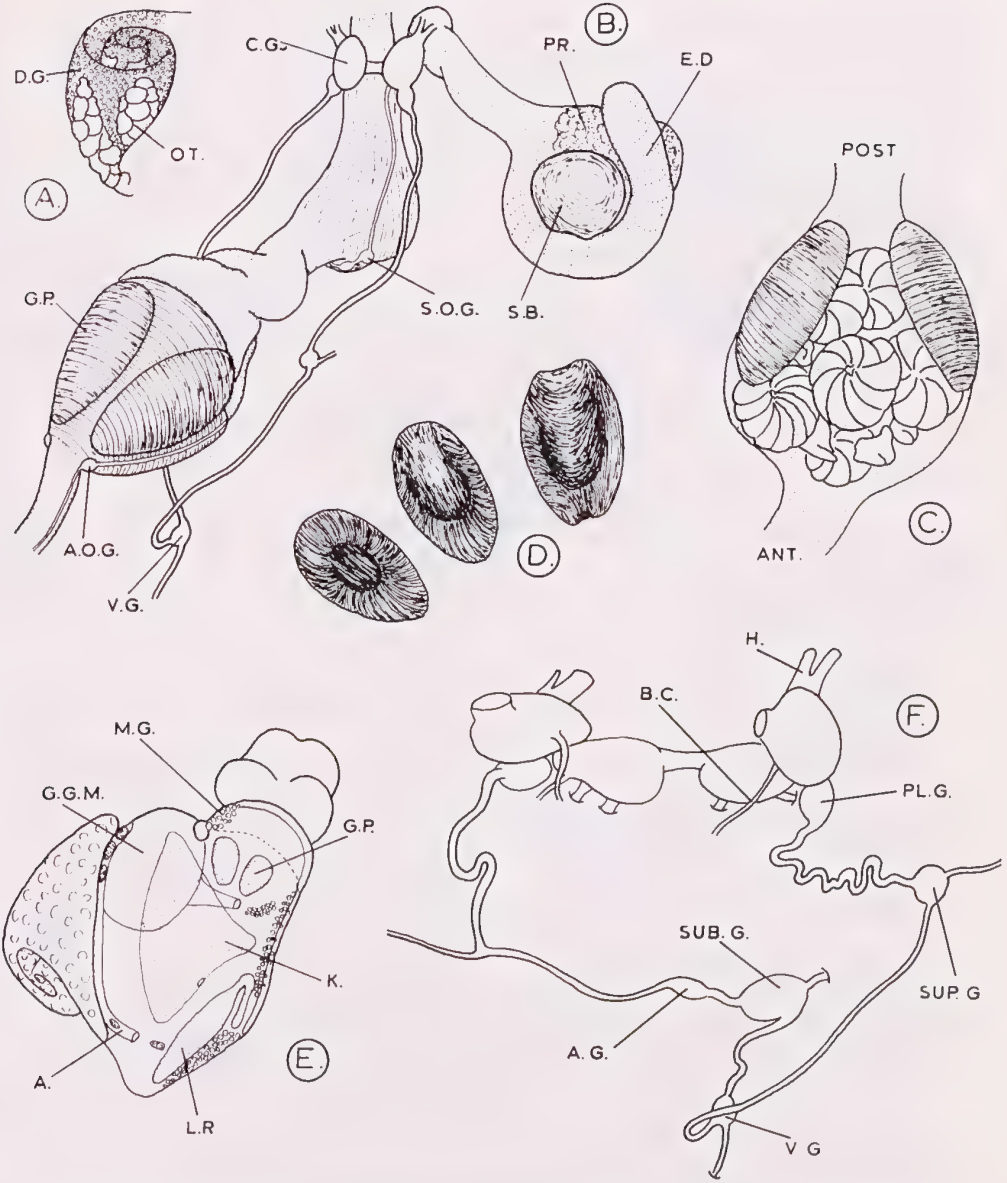

Fig. 1. A., visceral mass; B., foregut and penis; C., gizzard packed with foraminiferans; D., gizzard plates — showing inner side; E., showing mantle cavity; F., nervous system; A., anus; A.G., accessory gland; ANT., anterior end of gizzard; A.O.G., accessory oesophageal ganglion; B.C., cerebro-buccal connective; C.G., cerebral ganglion; D.G., digestive gland; E.D., ejaculatory duct; G.G.M., genital gland mass; G.P., gizzard plate; K., kidney; L.R., lower raphe; M.G., mantle glands; H., nerve to Hancock's Organ; O.T., ovitestis; PL.G., pleural ganglion; POST., posterior end of gizzard; PL.G., pleural ganglion; S.B., spermatic bulb; S.O.G., buccal ganglion; SUB.G., suboesophageal ganglion; SUP.G., supraoesophageal ganglion; V.G., visceral ganglion.

surface and apparently block the posterior end of the crop. Although the musculature of the " gizzard " or posterior region of the crop, is only slight, the broken tests of foraminiferans found in the intestine suggest that they have been crushed by the gizzard plates.

From the gizzard, the posterior oesophagus runs back to the stomach, which is only distinguishable because of the openings of the ducts to the digestive gland. The ciliated intestine runs behind the genital gland mass (Fig. 1E), along the back of the mantle cavity, to open near the ventral raphe. The digestive gland, greeny-brown in life, occupies the dorsal half of the visceral whorls (Fig. 1A).

The muddy bottom, where this species was found alive, contained many foraminiferans of a large variety of genera. Ten or eleven specimens had crops filled with food; this consisted solely of *Notorotalia* specimens. It is possible that *Relichna murdochi* feeds specifically on this animal.

Mantle Cavity: The mantle cavity is large (Fig. 1E) and the kidney occupies a major portion of the roof. The gill has been lost, but the upper and lower raphae are well developed. The loss of the gill has been supplemented by the development of extensive blood sinuses in the roof and floor of the mantle cavity (Fig. 2B).

Three or four glandular areas (M.G.) produce a white mucoid secretion similar to that of the repugnatorial glands of the Acteonidae (Fretter & Graham, 1954). These are situated above the mantle opening, along the raphal region and at the left anterior corner of the mantle flap, outside the mantle cavity.

The opening of the mantle cavity is relatively small, being only half the width of the cavity itself. The lower raphe is large and from the right edge of the mantle opening, it runs to the anterior right corner of the mantle cavity.

Reproductive System: The yellow ovitestis occupies the ventral half of the visceral whorls. From this the ovitestis duct, often distended with endogenous sperm, runs down to the fertilisation chamber (Fig. 2D). A small sac opens into the ovitestis duct just before it enters the genital gland mass and this is possibly an endogenous sperm sac. Opening off the fertilisation chamber, is a large exogenous sperm sac, (often distended with sperm), an albumen gland, and a posterior mucous gland, staining dark grey in Weigert's iron haemotoxylin and van Gieson. The anterior end of the fertilisation chamber is lined with a glandular epithelium which may be the capsule gland. From the fertilisation chamber, the anterior mucous gland, forming the pallial gonoduct, and staining lightly in Weigert's iron haemotoxylin, runs forward to open near the left edge of the mantle opening. Near the genital opening a duct runs off to the gametolytic sac, a large brown sac alongside the genital gland mass. The external, ciliated, endogenous sperm groove runs from the genital opening, forward, along the side of the body to the opening of the penis sac on the right of the mouth.

The penis is large, and lies alongside, and to the right, of the fore-gut (Fig. 1B). A wide ciliated duct runs back from the penial opening to a large, unciliated, spermatic bulb; at the entrance of the bulb is a large muscular papilla. Also opening off the duct are a large, short prostate gland, and a long sac which may be an ejaculatory duct. This " ejaculatory duct " is muscular and is also lined with glandular tissue staining brown in both Mallory and Heidenhain and Weigert's iron haemotoxylin and van Gieson.

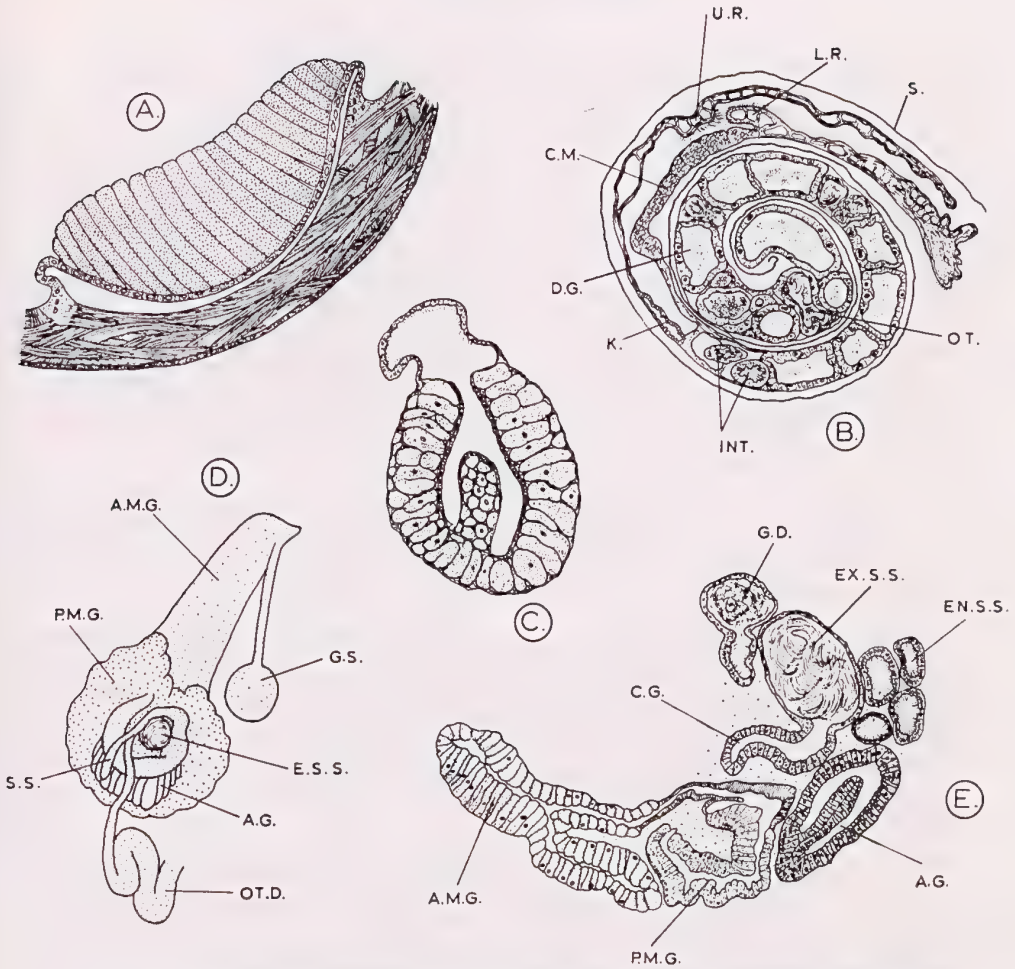

Fig. 2. A., section through gizzard plate showing rod-like formation; B., transverse section through whole animal; C., transverse section through the posterior buccal bulb; D., reproductive system; E., longitudinal section through genital gland mass; A.G., albumen gland; A.M.G., anterior mucous gland; C.G., capsule gland; C.M., columellar muscle; D.G., digestive gland; E.S.S., exogenous sperm sac; EN.S.S., endogenous sperm sac; G.D. gonoduct; G.S., gametolytic sac; INT., intestine; K., kidney; L.R., lower raphe; OT., ovotestis; OT.D., ovitestis duct; P.M.G., posterior mucous gland; S., shell; S.S., endogenous sperm sac; U.R., upper raphe.

Nervous System: The illustration of the nervous system (Fig. 1F) shows the supra-oesophageal ganglion positioned to the right of the visceral and sub-oesophageal ganglion. Before dissection however, it lies left of these ganglia. On casual examination, *Relichna* appears to exhibit a streptoneurous condition. However, since the connective between the left pleural ganglion and the suboesophageal ganglion is the only cord pass under the alimentary canal, the system is basically euthyneurous. Minichev (1967) described a similar situation in *Retusa operculata* Minichev, 1966, but in that species, the pleural ganglia are fused to the cerebral ganglia.

DISCUSSION

The Retusidae, like many other groups of shelled opisthobranchs, is ill-defined. Descriptions of the animals are few, and these are rarely more tnan statements describing the shape of the gizzard plates and the presence or absence of radular teeth.

A study of *Rhizorus persimilis* (Morch, 1875) by Marcus and Marcus (1960) shows that this genus, which is usually placed in a separate family Rhizoridae, should really be considered as belonging to the Retusidae. The three genera, *Rhizorus, Retusa* and *Relichna* are typified by the small cylindrical shell, the lack of a gill and the loss of the radular. The gizzard plates of a number of species of *Retusa* have been described; those of the type species *R. obtusa* by Hurst (1965), *R. operculata* by Minichev (1967), *R. nitidula* by Sars (1878), *R. sosa* by Marcus & Marcus (1969); I have examined *R. oruaensis.* In all cases, the three plates have raised blunt denticles on the inner surface. The constant nature of this feature suggests that it can be considered to be characteristic of the genus.

Rhizorus persimilis can be typified by the pointed upper end of the shell and the lack of gizzard plates, which are also a characteristic of the New Zealand species *Rhizorus nesentus* Finlay, 1926 (personal observations).

Relichna differs from both these genera in the form of the gizzard plates. From the illustrations of Minichev (1967) and Sars (1878) we can see that the gizzard plates of *Retusa* are formed, as in *Relichna,* by closely packed vertical rods. In *Retusa* some of these rods are extended into large protuberances while in *Relichna* the inner rods are much shorter forming a concavity. Because of the constancy of the denticulate gizzard plates in *Retusa* I feel justified in erecting a new genus for *Relichna murdochi.*

The relationship of the Retusidae to other opisthobranchs is not clear. The reproductive system is monaulic (Marcus & Marcus, 1960) and the penis is complex (Minichev, 1967). The monaulic system, the external sperm groove and invaginable penis are also typical of the Philinidae and Scaphandridae, while the loss of the gill and radula are certainly specialisations. The interesting discovery of an operculate species of *Retusa* by Minichev (1966) however, shows that this group must be considered to be as primitive as the Acteonidae and to represent an independent line, quite separate from any other opisthobranch at present studied.

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REFERENCES

DELL, R. K., 1953. The archibenthal Mollusca of New Zealand. *Dominion Museum Bulletin* No. 18. Wellington, New Zealand.

FRETTER, V. and A. GRAHAM, 1954. Observations on the Opisthobranch Mollusc *Acteon tornatilis* (L). *J. Mar. Biol. Ass. U.K.*, 33: 565 - 585.

HURST, A., 1965. Studies on the structure and function of the feeding apparatus of *Philine aperta* with a comparative consideration of some other Opisthobranchs. *Malacologia*, 2 (3): 281 - 347.

LEMCHE, H., 1956. The anatomy and histology of *Cylichna* (Gastropoda Tectibranchia). *Spolia. Zool. Mus. Hauniensis*, 16: 1 - 278.

MARCUS, E. and E. MARCUS, 1960. Opisthobranchs from American Atlantic warm-waters. *Bull. Mar. Sci. Gulf and Caribbean*, 10 (2): 129 - 203.

——— 1969. Opisthobranchian and Lamellarian Gastropods collected by the "Vema." *Amer. Mus. Novit.*, 2368: 1 - 33.

MINICHEV, Y. S., 1966. Morphological peculiarities of abyssal Cephalaspidea (Gastropoda, Opisthobranchia). *Zool. Zh.*, 45 (4): 509 - 517. (In Russian).

——— 1967. Studies on the morphology of the lower Opisthobranchia. *Trudy Zool. Instit. (Akad. Nauk. SSR)*, 44: 109 - 182. (In Russian).

MURDOCH, R. and H. SUTER, 1906. Results of dredging on the Continental Shelf of New Zealand. *Trans. N.Z. Inst.*, 38: 278 - 281.

POWELL, A. W. B., 1946. *The Shellfish of New Zealand.* Whitcombe & Tombs Ltd., Christchurch.

SARS, G., 1878. *Mollusca Regionis Articae Norwegiae.* Indbydelseschrift Univ. Christiana.

SUTER, H., 1913. *Manual of the New Zealand Mollusca.* Goverment Printer, Wellington.